UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,397	01/02/2004	Takeshi Yamamoto	247210US2	2859

22850 7590 03/30/2006

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
CHEN, WEN YING PATTY	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 03/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/749,397	YAMAMOTO, TAKESHI	
	Examiner	Art Unit	
	Wen-Ying P. Chen	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's Amendment filed Mar. 3, 2006 has been received and entered. Claims 13-19 are cancelled per the Amendment filed. Therefore, claims 1-12 are now pending in the current application.

Allowable Subject Matter

The indicated allowability of claims 1-6 is withdrawn in view of the newly discovered reference(s) to Imabayashi et al. (US 6678030). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

Claims 1-3, 6-9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cho et al. (US 2004/0114087) in view of Imabayashi et al. (US 6678030).

With respect to claim 1: Cho et al. disclose in Figure 12 a liquid crystal display apparatus including a liquid crystal layer (element 3) interposed between a first substrate (element 200) and a second substrate (element 100), comprising:

a first gap region (region corresponding to element 230R) with a first gap for interposition of the liquid crystal layer between the first substrate and the second substrate;

a second gap region (region corresponding to element 230B) with a second gap smaller than the first gap;

a first columnar spacer (element 323) formed in the first gap region on the first substrate; and

a second columnar spacer (element 321) formed in the second gap region on the first substrate.

Cho et al. fail to disclose that wherein a contact area of the first columnar spacer is greater than a contact area of the second columnar spacer.

However, Imabayashi et al. disclose in Column 7 lines 60-65 that formation of the contact areas of the columnar spacers with respect to the different gap areas of the liquid crystal display device such that the columnar spacer located in a larger gap area has a contact area greater than that of the columnar spacer located in a smaller gap area.

Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to construct a liquid crystal display apparatus as taught by Cho et al., wherein columnar spacers are formed with different contact areas as taught by Imabayashi et al., since Imabayashi et al. teach that the difference in the contact areas between the columnar spacers in relations to their heights helps to control the elasticities of the respective spacers themselves (Column 7, lines 48-55).

With respect to claim 7 (Amended): Cho et al. disclose in Figure 12 a liquid crystal display apparatus including a liquid crystal layer (element 3) interposed between a first substrate (element 200) and a second substrate (element 100), comprising:

a first gap region (region corresponding to element 230R) with a first gap for interposition of the liquid crystal layer between the first substrate and the second substrate;

a second gap region (region corresponding to element 230B) with a second gap smaller than the first gap;

a first columnar spacer (element 323) formed in the first gap region on the first substrate; and

a second columnar spacer (element 321) formed in the second gap region on the first substrate.

Cho et al. fail to disclose that wherein a dimension of the first columnar spacer is greater than a dimension of the second columnar spacer, wherein the dimensions of the first and second columnar spacers are defined as cross-sectional areas of the first and second columnar spacers in a horizontal plane parallel to the substrate.

However, Imabayashi et al. disclose in Column 7 lines 60-65 that formation of the cross-sectional areas of the columnar spacers with respect to the different gap areas of the liquid crystal display device such that the columnar spacer located in a larger gap area has a cross-sectional area greater than that of the columnar spacer located in a smaller gap area.

Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to construct a liquid crystal display apparatus as taught by Cho et al., wherein columnar spacers are formed with different cross-sectional areas as taught by Imabayashi et al., since Imabayashi et al. teach that the difference in the cross-sectional areas between the columnar spacers in relations to their heights helps to control the elasticities of the respective spacers themselves (Column 7, lines 48-55).

As to claims 2 and 8: Cho et al. further disclose in Figure 12 that the first gap region (region corresponding to element 230R) includes a first color filter (element 230R) that mainly

passes first color light, the second gap region (region corresponding to element 230B) includes a second color filter layer (element 230B) that mainly passes second color light, and the first color light has a wavelength greater than a wavelength of the second color light (Red color light has a wavelength greater than blue color light).

As to claims 3 and 9: Cho et al. further disclose in Figure 12 that the first substrate (element 200) includes, in the first gap region (region corresponding to element 230R), a first color filter layer (element 230R) that mainly passes first color light, and includes, in the second gap region (region corresponding to element 230B), a second color filter layer (element 230B) that mainly passes second color light.

As to claims 6 and 12: Cho et al. further disclose in Paragraph 0072 that the first substrate includes a counter electrode common for all pixels.

Claims 1-3 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. (US 6842207) in view of Imabayashi et al. (US 6678030).

With respect to claim 1: Nishida et al. disclose in Figure 12b a liquid crystal display apparatus including a liquid crystal layer (element 4) interposed between a first substrate (element 10) and a second substrate (element 10), comprising:

a first gap region (region corresponding to element 6) with a first gap for interposition of the liquid crystal layer between the first substrate and the second substrate;

a second gap region (region corresponding to element 8) with a second gap smaller than the first gap;

a first columnar spacer (element 26) formed in the first gap region on the first substrate; and

a second columnar spacer (element 26) formed in the second gap region on the first substrate.

Nishida et al. further disclose that the columnar spacer are formed to have different heights (Column 17, lines 1-12, wherein the spacers can be formed any where within the pixel region and thus the thickness of each of the spacers in each pixel region wherein the color filter layer thicknesses are different are adjusted accordingly, since the spacers have different heights, therefore their volumes are thus different), but fail to disclose that wherein a contact area of the first columnar spacer is greater than a contact area of the second columnar spacer.

However, Imabayashi et al. disclose in Column 7 lines 60-65 that formation of the contact areas of the columnar spacers with respect to the different gap areas of the liquid crystal display device such that the columnar spacer located in a larger gap area has a contact area greater than that of the columnar spacer located in a smaller gap area.

Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to construct a liquid crystal display apparatus as taught by Nishida et al., wherein columnar spacers are formed with different contact areas as taught by Imabayashi et al., since Imabayashi et al. teach that the difference in the contact areas between the columnar spacers in relations to their heights helps to control the elasticities of the respective spacers themselves (Column 7, lines 48-55).

With respect to claim 7 (Amended): Nishida et al. disclose in Figure 12b a liquid crystal display apparatus including a liquid crystal layer (element 4) interposed between a first substrate (element 10) and a second substrate (element 10), comprising:

a first gap region (region corresponding to element 6) with a first gap for interposition of the liquid crystal layer between the first substrate and the second substrate;

a second gap region (region corresponding to element 8) with a second gap smaller than the first gap;

a first columnar spacer (element 26) formed in the first gap region on the first substrate; and

a second columnar spacer (element 26) formed in the second gap region on the first substrate.

Nishida et al. further disclose that the columnar spacer are formed to have different heights (Column 17, lines 1-12, wherein the spacers can be formed any where within the pixel region and thus the thickness of each of the spacers in each pixel region wherein the color filter layer thicknesses are different are adjusted accordingly, since the spacers have different heights, therefore their volumes are thus different), but fail to disclose that wherein a dimension of the first columnar spacer is greater than a dimension of the second columnar spacer, wherein the dimensions of the first and second columnar spacers are defined as cross-sectional areas of the first and second columnar spacers in a horizontal plane parallel to the substrate.

However, Imabayashi et al. disclose in Column 7 lines 60-65 that formation of the cross-sectional areas of the columnar spacers with respect to the different gap areas of the liquid crystal

display device such that the columnar spacer located in a larger gap area has a cross-sectional area greater than that of the columnar spacer located in a smaller gap area.

Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to construct a liquid crystal display apparatus as taught by Nishida et al., wherein columnar spacers are formed with different cross-sectional areas as taught by Imabayashi et al., since Imabayashi et al. teach that the difference in the cross-sectional areas between the columnar spacers in relations to their heights helps to control the elasticities of the respective spacers themselves (Column 7, lines 48-55).

As to claims 2 and 8: Nishida et al. further disclose in Figure 12b that the first gap region (region corresponding to element 6) includes a first color filter (element 6) that mainly passes first color light, the second gap region (region corresponding to element 8) includes a second color filter layer (element 8) that mainly passes second color light, and the first color light has a wavelength greater than a wavelength of the second color light (Red color light has a wavelength greater than blue color light).

As to claims 3 and 9: Nishida et al. further disclose in Figure 12b that the first substrate (element 10) includes, in the first gap region (region corresponding to element 6), a first color filter layer (element 6) that mainly passes first color light, and includes, in the second gap region (region corresponding to element 8), a second color filter layer (element 8) that mainly passes second color light.

Claims 4 and 10are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. (US 6842207) and Imabayashi et al. (US 6678030) in view of Ochiai et al. (US 6768531).

Nishida et al. and Imabayashi et al. disclose all of the limitations set forth in the previous claims, but fail to disclose that the first substrate is of an active matrix substrate.

However, Ochiai et al. disclose in Figure 10 a liquid crystal display wherein the columnar spacer (element SUP) is formed on the color filter layers with different thicknesses (element FIL) on the first substrate and the first substrate further includes scan lines (Figure 1, element GL) disposed in a row direction, signal lines (element DL) disposed in a column direction, switching elements (Figure 2, element TFT) disposed near intersections of the scan lines and the signal lines, and pixel electrodes (element PX) connected to the switching elements and disposed in a matrix.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to construct a liquid crystal display having variable cell gaps formed by different thickness color filter layers having columnar spacers deposited thereon as taught by Nishida et al. and Imabayashi et al. wherein the columnar spacer is formed on the color filter layers with different thicknesses on an active matrix substrate as taught by Ochiai et al., Ochiai et al. teach that by forming the color filter layer along with the columnar spacer on the active matrix substrate helps to reduce the influence of the displacement of alignment of the opposing substrate, thus results in a high definition display device (Column 1, lines 34-41).

Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al. (US 6842207) and Imabayashi et al. (US 6678030) in view of YI et al. (US 2003/0104291).

Nishida et al. and Imabayashi et al. disclose all of the limitations set forth in the previous claims and Nishida et al. further disclose in Figure 12b that the first substrate includes a light

shield layer (element 9) formed in a picture-frame shape along a peripheral edge of a display region, but fail to disclose that the first columnar spacer and the second columnar spacer and the light shield layer are formed of the same material.

However, YI et al. teach in Paragraph 0041 that the spacer and black matrix (light shield layer) can be made of the same material.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to construct a liquid crystal display as taught by Nishida et al. and Imabayashi et al. wherein the light shield layer and the columnar spacers are formed of the same material as taught by YI et al., since YI et al. teach that production cost can be reduced by using the same material (Paragraph 0041).

Claims 1, 6, 7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over YI et al. (US 2003/0104291) in view of Nishida et al. (US 6842207) further in view of Imabayashi et al. (US 6678030).

With respect to claims 1 and 6: YI et al. disclose in Figure 5E a liquid crystal display apparatus comprising a first substrate (element 100) including a counter electrode (element 110), liquid crystal layer interposed between a first substrate and a second substrate comprising of first and second gap regions (regions between element 118 corresponding to elements 108a-108c) and first and second columnar spacers (element 118) formed in the gap regions.

YI et al. fail to disclose that the second gap region has a second gap smaller than the first gap and that the first columnar spacer has a contact area greater than a contact area of the second columnar spacer.

However, Nishida et al. disclose in Figure 12b and Column 7 lines 1-12 a liquid crystal display apparatus comprising:

a first gap region (region corresponding to element 6) with a first gap for interposition of the liquid crystal layer between the first substrate and the second substrate;

a second gap region (region corresponding to element 8) with a second gap smaller than the first gap;

a first columnar spacer (element 26) formed in the first gap region on the first substrate; and

a second columnar spacer (element 26) formed in the second gap region on the first substrate,

wherein a dimension and volume of the first columnar spacer is greater than a dimension of the second columnar spacer (Column 17, lines 1-12, wherein the spacers can be formed any where within the pixel region and thus the thickness of each of the spacers in each pixel region wherein the color filter layer thicknesses are different are adjusted accordingly, since the spacers have different heights, therefore their volumes are thus different) and further Imabayashi et al. disclose in Column 7 lines 60-65 that formation of the contact areas of the columnar spacers with respect to the different gap areas of the liquid crystal display device such that the columnar spacer located in a larger gap area has a contact area greater than that of the columnar spacer located in a smaller gap area.

Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to construct a liquid crystal display apparatus as taught by YI et al., wherein the first gap and that the first columnar spacer has a dimension and volume greater than a

dimension and volume of the second columnar spacer as taught by Nishida et al., since Nishida et al. teach that a very good display which does not exhibit any coloring in whichever direction it is viewed can be obtained by varying the gap size of the liquid crystal layer and that the columnar spacers with different dimension and volume are provided as to maintain the different cell gaps (Abstract) and to form columnar spacers with different contact areas as taught by Imabayashi et al., since Imabayashi et al. teach that the difference in the contact areas between the columnar spacers in relations to their heights helps to control the elasticities of the respective spacers themselves (Column 7, lines 48-55).

With respect to claims 7 and 12 (Amended): YI et al. disclose in Figure 5E a liquid crystal display apparatus comprising a first substrate (element 100) including a counter electrode (element 110), liquid crystal layer interposed between a first substrate and a second substrate comprising of first and second gap regions (regions between element 118 corresponding to elements 108a-108c) and first and second columnar spacers (element 118) formed in the gap regions.

YI et al. fail to disclose that the second gap region has a second gap smaller than the first gap and that the first columnar spacer has a dimension greater than a dimension of the second columnar spacer, wherein the dimensions of the first and second columnar spacers are defined as cross-sectional areas of the first and second columnar spacers in a horizontal plane parallel to the substrate.

However, Nishida et al. disclose in Figure 12b and Column 17 lines 1-12 a liquid crystal display apparatus comprising:

a first gap region (region corresponding to element 6) with a first gap for interposition of the liquid crystal layer between the first substrate and the second substrate;

a second gap region (region corresponding to element 8) with a second gap smaller than the first gap;

a first columnar spacer (element 26) formed in the first gap region on the first substrate; and

a second columnar spacer (element 26) formed in the second gap region on the first substrate,

wherein a dimension and volume of the first columnar spacer is greater than a dimension of the second columnar spacer (Column 17, lines 1-12, wherein the spacers can be formed any where within the pixel region and thus the thickness of each of the spacers in each pixel region wherein the color filter layer thicknesses are different are adjusted accordingly, since the spacers have different heights, therefore their volumes are thus different) and further Imabayashi et al. disclose in Column 7 lines 60-65 that formation of the cross-sectional areas of the columnar spacers with respect to the different gap areas of the liquid crystal display device such that the columnar spacer located in a larger gap area has a cross-sectional area greater than that of the columnar spacer located in a smaller gap area.

Therefore, it would have been obvious to one of ordinary skill in the art a the time the invention was made to construct a liquid crystal display apparatus as taught by YI et al., wherein the first gap and that the first columnar spacer has a dimension and volume greater than a dimension and volume of the second columnar spacer as taught by Nishida et al., since Nishida et al. teach that a very good display which does not exhibit any coloring in whichever direction it

is viewed can be obtained by varying the gap size of the liquid crystal layer and that the columnar spacers with different dimension and volume are provided as to maintain the different cell gaps (Abstract) and to form columnar spacers with different cross-sectional areas as taught by Imabayashi et al., since Imabayashi et al. teach that the difference in the cross-sectional areas between the columnar spacers in relations to their heights helps to control the elasticities of the respective spacers themselves (Column 7, lines 48-55).

Response to Arguments

Applicant's arguments with respect to all claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wen-Ying P. Chen whose telephone number is (571)272-8444. The examiner can normally be reached on 8:00-5:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571)272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wen-Ying P Chen
Examiner
Art Unit 2871

WPC
3/23/06

ANDREW SCHECHTER
PRIMARY EXAMINER